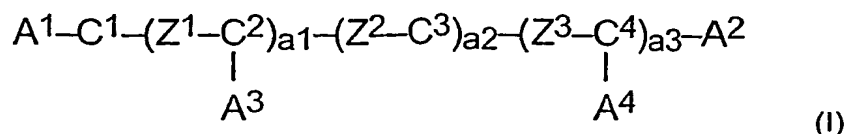


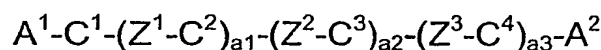
### Claims

1. A mesogenic, cross-linkable mixture comprising:
  - i) a cross-linkable liquid crystalline host comprising at least one cross-linkable liquid crystalline compound, and
  - ii) at least one chiral or achiral rod shaped additive component, wherein said additive component has a rigid core and comprises at least two fused or linked, optionally substituted, non-aromatic, aromatic, carbocyclic or heterocyclic groups, and also comprises at least one optionally substituted alkyl residue, and at least one polymerizable group and wherein the additive component has a transition temperature to the isotropic state of 40 °C or lower.
2. A mixture according to claim 1, wherein the additive component has a transition temperature to the isotropic state of 20 °C or lower.
3. A mixture according to claim 1, wherein the additive component has a transition temperature to the isotropic state of 0 °C or lower.
4. A mixture according to any one of claims 1 to 3 having a clearing temperature of 30 °C or higher.
5. A mixture according to any one of claims 1 to 3 having a clearing temperature of 50 °C or higher.
6. A mixture according to any one of claims 1 to 5, wherein the liquid crystalline host has a clearing temperature of 50 °C or higher.
7. A mixture according to any preceding claim, wherein the additive component is a compound of formula (I):



wherein:

- $A^1$  to  $A^4$  are independently from each other hydrogen, a polar group such as nitro, cyano, a halogen, an optionally substituted methyl group, or an optionally substituted hydrocarbon group of 2 to 40 C-atoms, in which one or more C-atoms may be replaced by a heteroatom, in such a way that oxygen atoms are not linked to one another, with the proviso that at least one of  $A^1$  to  $A^4$  comprises a polymerizable group,
- $C^1$  to  $C^4$  are independently from each other optionally substituted non-aromatic, aromatic, carbocyclic or heterocyclic groups, preferably connected to each other at the opposite positions via the bridging groups  $Z^1$  to  $Z^3$ ,
- $Z^1$  to  $Z^3$  are independently from each other  $-\text{CH}(\text{OH})-$ ,  $-\text{CO}-$ ,  $-\text{CH}_2(\text{CO})-$ ,  $-\text{SO}-$ ,  $-\text{CH}_2(\text{SO})-$ ,  $-\text{SO}_2-$ ,  $-\text{CH}_2(\text{SO}_2)-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{COCF}_2-$ ,  $-\text{CF}_2\text{CO}-$ ,  $-\text{S-CO}-$ ,  $-\text{CO-S}-$ ,  $-\text{SOO}-$ ,  $-\text{OSO}-$ ,  $-\text{SOS}-$ ,  $-\text{CH}_2\text{-CH}_2-$ ,  $-\text{OCH}_2-$ ,  $-\text{CH}_2\text{O}-$ ,  $-\text{CH=CH}-$ ,  $-\text{C}\equiv\text{C}-$ ,  $-\text{CH=CH-COO}-$ ,  $-\text{OCO-CH=CH}-$ ,  $-\text{CH=N}-$ ,  $-\text{C}(\text{CH}_3)=\text{N}-$ ,  $-\text{N=N}-$  or a single covalent bond,
- $a_1$ ,  $a_2$  and  $a_3$  are independently from each other integers from 0 to 3, such that  $1 \leq a_1 + a_2 + a_3 \leq 3$ ,
- with the proviso that the sequence:



describes the long molecular axis of the rod shaped additive components.

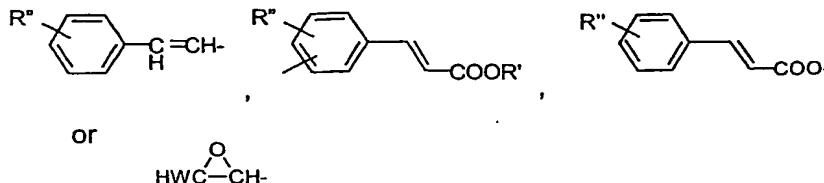
8. A mixture according to claim 7, wherein the additive component is a compound of formula (I), wherein at least one of  $A^1$  to  $A^4$  includes a polymerizable group, selected from a residue of formula (II):



wherein:

P

is hydrogen or a polymerizable group selected from groups comprising  $\text{CH}_2=\text{CW}-$ ,  $\text{CH}_2=\text{CW}-\text{O}-$ ,  $\text{CH}_2=\text{CW}-\text{COO}-$ ,  $\text{CH}_2=\text{C}(\text{Ph})-\text{COO}-$ ,  $\text{CH}_2=\text{CH}-\text{COO}-\text{Ph}-$ ,  $\text{CH}_2=\text{CW}-\text{CO}-\text{NH}-$ ,  $\text{CH}_2=\text{C}(\text{Ph})-\text{CONH}-$ ,  $\text{CH}_2=\text{C}(\text{COOR}')-\text{CH}_2-\text{COO}-$ ,  $\text{CH}_2=\text{CH}-\text{OOC}-$ ,  $(\text{Ph})-\text{CH}=\text{CH}-$ ,  $\text{CH}_3-\text{CH}=\text{N}-(\text{CH}_2)_{m1}-$ ,  $\text{HO}-$ ,  $\text{HS}-$ ,  $\text{HO}-(\text{CH}_2)_{m1}-$ ,  $\text{HS}-(\text{CH}_2)_{m1}-$ ,  $\text{HO}(\text{CH}_2)_{m1}\text{COO}-$ ,  $\text{HS}(\text{CH}_2)_{m1}\text{COO}-$ ,  $\text{HWN}-$ ,  $\text{HOC}(\text{O})-$ ,  $\text{CH}_2=\text{CH}-\text{Ph}-(\text{O})_{m2}$ ,



wherein:

W is H, F, Cl, Br or I or a  $\text{C}_{1-6}$  alkyl group,

$m_1$  is an integer having a value of from 1 to 9,

$m_2$  is an integer having a value of 0 or 1,

$\text{R}'$  is a  $\text{C}_{1-6}$  alkyl group,

$\text{R}''$  is a  $\text{C}_{1-6}$  alkyl group, methoxy, cyano, F, Cl, Br or I,

Sp

is an optionally substituted straight or branched  $\text{C}_{1-30}$  alkylene group, in which one or more  $-\text{CH}_2-$  groups may be replaced by a heteroatom and/or by a polar group and/or it is optionally possible that one or more carbon-carbon single bond(s) is/are replaced by a carbon-carbon double or a triple bond,

k

is an integer having a value of from 0 to 4,

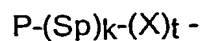
X

is  $-\text{O}-$ ,  $-\text{S}-$ ,  $-\text{NH}-$ ,  $-\text{N}(\text{CH}_3)-$ ,  $-\text{CH}(\text{OH})-$ ,  $-\text{CO}-$ ,  $-\text{CH}_2(\text{CO})-$ ,  $-\text{SO}-$ ,  $-\text{CH}_2(\text{SO})-$ ,  $-\text{SO}_2-$ ,  $-\text{CH}_2(\text{SO}_2)-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{OCO}-\text{O}-$ ,  $-\text{S}-\text{CO}-$ ,  $-\text{CO}-\text{S}-$ ,  $-\text{SOO}-$ ,  $-\text{OSO}-$ ,  $-\text{SOS}-$ ,  $-\text{CH}_2-\text{CH}_2-$ ,  $-\text{OCH}_2-$ ,  $-\text{CH}_2\text{O}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ , or a single bond,

t

is an integer having a value of 0 or 1.

9. A mixture according to any one of claims 7 to 8, wherein at least one of  $\text{A}^1$  to  $\text{A}^4$  of formula (I) is a group of formula (II):

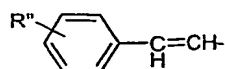


(II)

wherein:

P

is a polymerizable group such as  $\text{CH}_2=\text{CW}-$ ,  
 $\text{CH}_2=\text{CW}-\text{O}-$ ,  $\text{CH}_2=\text{CW}-\text{COO}-$  or



wherein:

W is H,  $\text{CH}_3$ , F, Cl, Br or I,

R'' is a  $\text{C}_{1-6}$  alkyl group, methoxy, cyano, F, Cl, Br or I.

Sp

is a  $\text{C}_{1-22}$  branched or straight-chain alkylene group, in which one or more  $-\text{CH}_2-$  groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from  $-\text{O}-$ ,  $-\text{CH}(\text{OH})-$ ,  $-\text{SO}_2-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{OCO}-\text{O}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ ,  $-(\text{CF}_2)_r-$ , with the proviso that no two oxygen atoms are directly linked to each other, and wherein r is an integer between 1 and 10,

k

is 1,

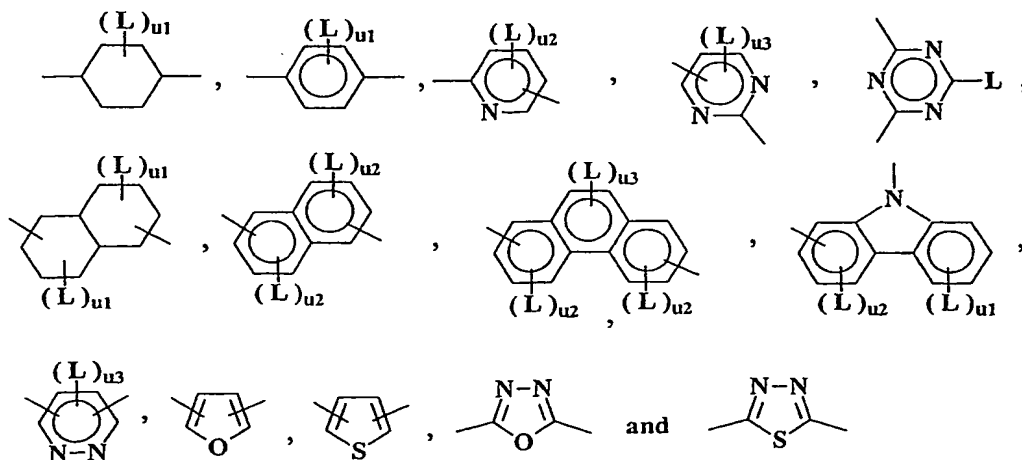
X

is  $-\text{O}-$ ,  $-\text{CO}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ , or a single bond, more preferably  $-\text{O}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$  or a single bond,

t

is 1.

10. A mixture according to any one of claims 7 to 9, wherein  $\text{C}^1$  to  $\text{C}^4$  are preferably selected from:



wherein:

L is -CH<sub>3</sub>, -COCH<sub>3</sub>, -NO<sub>2</sub>, -CN or halogen,

u<sub>1</sub> is 0, 1, 2, 3, or 4,

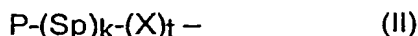
u<sub>2</sub> is 0, 1, 2, or 3,

u<sub>3</sub> is 0, 1, or 2.

11. A mixture according to any one of claims 7 to 10, wherein:

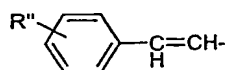
C<sup>1</sup> to C<sup>4</sup> are selected from optionally substituted cyclohexyl or cyclohexylene, phenyl or phenylene, naphthyl or naphthylene or phenanthryl or phenanthrylene,

A<sup>1</sup> to A<sup>4</sup> independently from each other is hydrogen, a polar group such as cyano, nitro, a halogen, or a group of formula (II)



in which:

P is hydrogen or a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O-, CH<sub>2</sub>=CW-COO- or



wherein:

W is H, CH<sub>3</sub>, F, Cl Br or I,

R'' is a C<sub>1-6</sub> alkyl group, methoxy, cyano, F, Cl, Br or I,

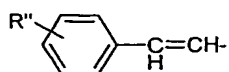
Sp is a C<sub>1-22</sub> branched or straight-chain alkylene group, in which one or more -CH<sub>2</sub>- groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from -O-, -CH(OH)-, -SO<sub>2</sub>-, -COO-, -OCO-, -OCO-O-, -CH=CH-, -C≡C-, -(CF<sub>2</sub>)<sub>r</sub>-, with the proviso that no two oxygen atoms are directly linked to each other, and wherein r is an integer between 1 and 10,

k is 1,

X is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond, more preferably -O-, -COO-, -OCO- or a single bond,

t is 1,

with the proviso that at least one of A<sup>1</sup> to A<sup>4</sup> comprises a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O-, CH<sub>2</sub>=CW-COO- or



wherein:

W is H, CH<sub>3</sub>, F, Cl, Br or I,

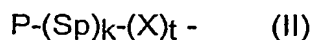
R'' is a C<sub>1-6</sub> alkyl group, methoxy, cyano, F, Cl, Br or I.

12. A mixture according to any one of claims 7 to 11, wherein:

A<sup>1</sup> comprises a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O-, CH<sub>2</sub>=CW-COO-,  
wherein:

W is H or CH<sub>3</sub>,

A<sup>2</sup> has the meaning of formula (II),



in which:

P is hydrogen or a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O- or CH<sub>2</sub>=CW-COO-,  
wherein:

W is H or CH<sub>3</sub>,

Sp is a branched C<sub>3</sub>-C<sub>16</sub> alkylene group, optionally comprising at least one oxocarbonyl or carbonyloxy group, or is a straight C<sub>2</sub>-C<sub>16</sub> alkylene group, comprising at least one oxocarbonyl or carbonyloxy group, wherein one or more -CH<sub>2</sub>- groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from -O-, -CH=CH-, -C≡C-,

with the proviso that no two oxygen atoms are directly linked to each other,

k is 1,

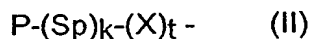
X is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond, more preferably -O-, -COO-, -OCO- or a single bond,

t is 1

A<sup>4</sup> is hydrogen.

13. A mixture according to any one of claims 7 to 12, wherein:

A<sup>1</sup> has the meaning of formula (II),



wherein:

P is hydrogen or a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O- or CH<sub>2</sub>=CW-COO-, wherein:

W is H or CH<sub>3</sub>,

Sp is a branched C<sub>3</sub>-C<sub>16</sub> alkylene group, optionally comprising at least one oxocarbonyl or group, or is a straight C<sub>2</sub>-C<sub>16</sub> alkylene group, comprising at least one oxocarbonyl or carbonyloxy group, wherein one or more -CH<sub>2</sub>- groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from -O-, -CH=CH-, -C≡C-, with the proviso that no two oxygen atoms are directly linked to each other,

k is 1,

X is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond, more preferably -O-, -COO-, -OCO- or a single bond,

t is 1,

A<sup>2</sup>

comprises a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O-, or CH<sub>2</sub>=CW-COO-, wherein:

W is H or CH<sub>3</sub>,

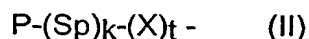
A<sup>4</sup>

is hydrogen.

14. A mixture according to any one of claims 7 to 13, wherein:

A<sup>1</sup>

has the meaning of formula (II),



wherein:

P is hydrogen or a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O- or CH<sub>2</sub>=CW-COO-, wherein:

W is H or CH<sub>3</sub>,

Sp is a branched C<sub>3</sub>-C<sub>16</sub> alkylene group, optionally comprising at least one oxocarbonyl or carbonyloxy group, or is a straight C<sub>2</sub>-C<sub>16</sub> alkylene group, comprising at least one oxocarbonyl or carbonyloxy group, wherein one or more -CH<sub>2</sub>- groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from -O-, -CH=CH-, -C≡C-, with the proviso that no two oxygen atoms are directly linked to each other,

k is 1,



X is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond, more preferably -O-, -COO-, -OCO- or a single bond,

t is 1,

A<sup>3</sup>

comprises a polymerizable group such as CH<sub>2</sub>=CW-,

CH<sub>2</sub>=CW-O-, or CH<sub>2</sub>=CW-COO-,

wherein:

W is H or CH<sub>3</sub>,

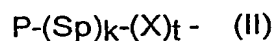
A<sup>4</sup>

is hydrogen.

15. A mixture according to any one of claims 7 to 14, wherein:

A<sup>2</sup>

has the meaning of formula (II),



in which:

P is hydrogen or a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O- or CH<sub>2</sub>=CW-COO-, wherein:

W is H or CH<sub>3</sub>,

Sp is a branched C<sub>3</sub>-C<sub>16</sub> alkylene group, optionally comprising at least one oxocarbonyl or carbonyloxy group, or is a straight C<sub>2</sub>-C<sub>16</sub> alkylene group, comprising at least one oxocarbonyl or carbonyloxy group, wherein one or more -CH<sub>2</sub>- groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from -O-, -CH=CH-, -C≡C-, with the proviso that no two oxygen atoms are directly linked to each other,

k is 1,

X is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond, more preferably -O-, -COO-, -OCO- or a single bond,

t is 1,

A<sup>3</sup>

comprises a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O-, or CH<sub>2</sub>=CW-COO-, wherein:

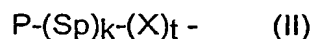
W is H or CH<sub>3</sub>,

A<sup>4</sup>

is hydrogen.

16. A mixture according to any one of claims 7 to 15, wherein:

A<sup>1</sup> and A<sup>2</sup> have the meaning of formula (II),



wherein:

P is hydrogen or a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O- or CH<sub>2</sub>=CW-COO-, wherein:

W is H or CH<sub>3</sub>,

Sp is a branched C<sub>3</sub>-C<sub>16</sub> alkylene group, optionally comprising at least one oxocarbonyl or carbonyloxy group, or is a straight C<sub>2</sub>-C<sub>16</sub> alkylene group, comprising at least one oxocarbonyl or carbonyloxy group, wherein one or more -CH<sub>2</sub>- groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from -O-, -CH=CH-, -C≡C-, with the proviso that no two oxygen atoms are directly linked to each other,

k is 1,

X is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond, more preferably -O-, -COO-, -OCO- or a single bond,

t is 1,

$A^3$  comprises a polymerizable group such as  $CH_2=CW-$ ,  $CH_2=CW-O-$ , or  $CH_2=CW-COO-$ , wherein:

W is H or  $CH_3$ ,

$A^4$  is hydrogen.

17. A mixture according to any one of claims 7 to 16, wherein at least one of  $A^1$  to  $A^3$  has the meaning of formula (II),

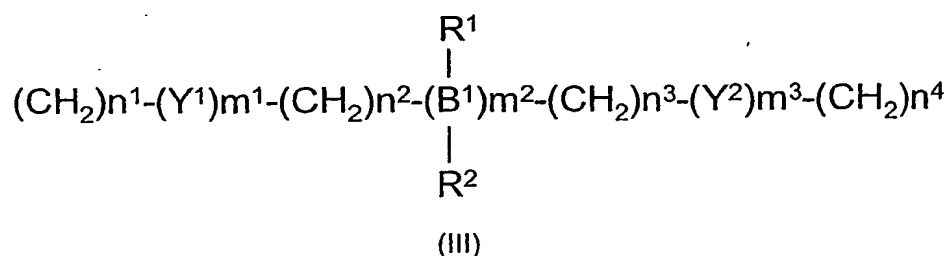


wherein:

P is hydrogen or a polymerizable group such as  $CH_2=CW-$ ,  $CH_2=CW-O-$ ,  $CH_2=CW-COO-$ , wherein:

W is H or  $CH_3$ ,

Sp has the meaning of formula (III)



wherein:

$Y^1$  and  $Y^2$  each independently represent -OCO- or -COO-,

$B^1$  represents C or CH,

$R^1$  and  $R^2$  each independently represent hydrogen or a C<sub>1</sub>-C<sub>12</sub> alkyl residue, preferably a C<sub>1</sub>-C<sub>6</sub> alkyl residue, such as a methyl, ethyl, propyl, butyl, pentyl, hexyl or isopropyl residue,

$n_1, n_2, n_3$  and  $n_4$  are independently integers from 0 to 15, such that  $0 \leq n_1 + n_2 + n_3 + n_4 \leq 15$ ,

$m_1, m_2$  and  $m_3$  are independently integers from 0 to 3, such that  $1 \leq m_1 + m_2 + m_3 \leq 3$  and

wherein:

one or more -CH<sub>2</sub>- groups present in the hydrocarbon chain of (III) may be replaced, independently, by one or more groups selected from -O-, -CH=CH- or -C≡C-, with the proviso that the carbon-carbon double bond of P is not directly connected to the carbon atom of  $Y^1$  or  $Y^2$ ,

$k$  is 1,  
 $X$  is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond, more preferably -O-, -COO-, -OCO- or a single bond,  
 $t$  is 1.

18. A mixture according to any one of claims 7 to 17, wherein at least one of  $A^1$  to  $A^3$  has the meaning of formula (II),



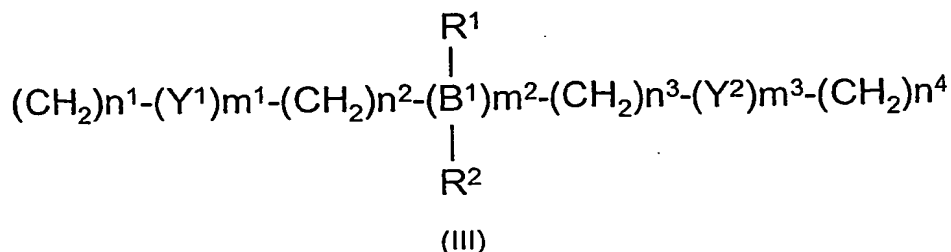
wherein:

$P$  is hydrogen or a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O-, CH<sub>2</sub>=CW-COO-,

wherein:

$W$  is H or CH<sub>3</sub>,

$Sp$  has the meaning of formula (III)



wherein:

- $\text{Y}^1$  and  $\text{Y}^2$  each independently represent  $-\text{OCO}-$  or  $-\text{COO}-$ ,  
 $\text{B}^1$  represents C or CH,  
 $\text{R}^1$  is hydrogen  
 $\text{R}^2$  represents a methyl, ethyl, propyl, butyl, pentyl or hexyl group and most preferably a methyl or ethyl group,  
 $n^1, n^2, n^3$  and  $n^4$  are independently integers from 0 to 15, such that  $0 \leq n^1 + n^2 + n^3 + n^4 \leq 15$ ,  
 $m^1, m^2$  and  $m^3$  are independently integers from 0 to 3, such that  $1 \leq m^1 + m^2 + m^3 \leq 3$ , and

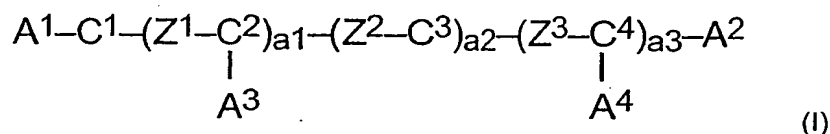
wherein:

one or more  $-\text{CH}_2-$  groups present in the hydrocarbon chain of (III) may be replaced, independently, by one or more groups selected from  $-\text{O}-$ ,  $-\text{CH}=\text{CH}-$  or  $-\text{C}\equiv\text{C}-$ ,  
 with the proviso that the carbon-carbon double bond of P is not directly connected to the carbon atom of  $\text{Y}^1$  or  $\text{Y}^2$ ,

- $k$  is 1,  
 $X$  is  $-\text{O}-$ ,  $-\text{CO}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ , or a single bond, more preferably  $-\text{O}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$  or a single bond,  
 $t$  is 1.

19. A mixture according to any one of claims 1 to 18 comprising further agents, such as cross-linking agents, stabilizing agents, initiators, dyes, other chiral or achiral additives and plasticizers.

20. A mixture according to any one of claims 1 to 19 in form of an elastomer, polymer gel, polymer network or polymer film.
21. A chiral or achiral rod shaped compound, wherein said compound has a rigid core and comprises at least two fused or linked, optionally substituted, non-aromatic, aromatic, carbocyclic or heterocyclic groups, and also comprises at least one optionally substituted alkyl residue, and also comprises at least one polymerizable group and has a transition temperature to the isotropic state of 40 °C or lower.
22. A compound according to claim 21, wherein the compound has a transition temperature to the isotropic state of 20 °C or lower.
23. A compound according to claims 21 to 22, wherein the compound has transition temperature to the isotropic state of 0 °C or lower.
24. A compound according to any one of claims 21 to 23 of formula (I):



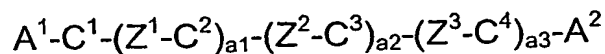
wherein:

$A^1$  to  $A^4$  are independently from each other hydrogen, a polar group such as nitro, cyano, a halogen, an optionally substituted methyl group, or an optionally substituted hydrocarbon group of 2 to 40 C-atoms, in which one or more C-atoms may be replaced by a heteroatom, in such a way that oxygen atoms are not linked to one another,

with the proviso that at least one of  $A^1$  to  $A^4$  comprises a polymerizable group,

$C^1$  to  $C^4$  are independently from each other optionally substituted non-aromatic, aromatic, carbocyclic or heterocyclic groups, preferably connected to each other at the opposite positions via the bridging groups  $Z^1$  to  $Z^3$ ,

- $Z^1$  to  $Z^3$  are independently from each other  $-\text{CH}(\text{OH})-$ ,  $-\text{CO}-$ ,  $-\text{CH}_2(\text{CO})-$ ,  $-\text{SO}-$ ,  $-\text{CH}_2(\text{SO})-$ ,  $-\text{SO}_2-$ ,  $-\text{CH}_2(\text{SO}_2)-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{COCF}_2-$ ,  $-\text{CF}_2\text{CO}-$ ,  $-\text{S}-\text{CO}-$ ,  $-\text{CO}-\text{S}-$ ,  $-\text{SOO}-$ ,  $-\text{OSO}-$ ,  $-\text{SOS}-$ ,  $-\text{CH}_2-\text{CH}_2-$ ,  $-\text{OCH}_2-$ ,  $-\text{CH}_2\text{O}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ ,  $-\text{CH}=\text{CH}-\text{COO}-$ ,  $-\text{OCO}-\text{CH}=\text{CH}-$ ,  $-\text{CH}=\text{N}-$ ,  $-\text{C}(\text{CH}_3)=\text{N}-$ ,  $-\text{N}=\text{N}-$  or a single covalent bond,
- $a_1$ ,  $a_2$  and  $a_3$  are independently from each other integers from 0 to 3, such that  $1 \leq a_1 + a_2 + a_3 \leq 3$ ,
- with the proviso that the sequence:



describes the long molecular axis of the rod shaped additive components.

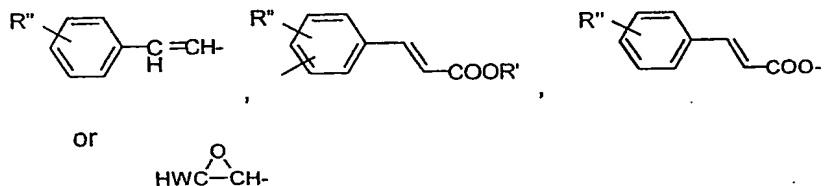
25. A compound according to claim 24, wherein at least one of  $\text{A}^1$  to  $\text{A}^4$  includes a polymerizable group, selected from a residue of formula (II):



wherein:

P

is hydrogen or a polymerizable group selected from groups comprising  $\text{CH}_2=\text{CW}-$ ,  $\text{CH}_2=\text{CW}-\text{O}-$ ,  $\text{CH}_2=\text{CW}-\text{COO}-$ ,  $\text{CH}_2=\text{C}(\text{Ph})-\text{COO}-$ ,  $\text{CH}_2=\text{CH}-\text{COO}-\text{Ph}-$ ,  $\text{CH}_2=\text{CW}-\text{CO}-\text{NH}-$ ,  $\text{CH}_2=\text{C}(\text{Ph})-\text{CONH}-$ ,  $\text{CH}_2=\text{C}(\text{COOR}')-\text{CH}_2-\text{COO}-$ ,  $\text{CH}_2=\text{CH}-\text{OOC}-$ ,  $(\text{Ph})-\text{CH}=\text{CH}-$ ,  $\text{CH}_3-\text{CH}=\text{N}-(\text{CH}_2)_{m_1}-$ ,  $\text{HO}-$ ,  $\text{HS}-$ ,  $\text{HO}-(\text{CH}_2)_{m_1}-$ ,  $\text{HS}-(\text{CH}_2)_{m_1}-$ ,  $\text{HO}(\text{CH}_2)_{m_1}\text{COO}-$ ,  $\text{HS}(\text{CH}_2)_{m_1}\text{COO}-$ ,  $\text{HWN}-$ ,  $\text{HOC}(\text{O})-$ ,  $\text{CH}_2=\text{CH}-\text{Ph}-(\text{O})_{m_2}$ ,



wherein:

W is H, F, Cl, Br or I or a  $\text{C}_{1-6}$  alkyl group,

$m_1$  is an integer having a value of from 1 to 9,

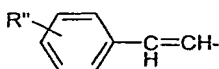
- $m_2$  is an integer having a value of 0 or 1,  
 $R'$  is a  $C_{1-6}$  alkyl group,  
 $R''$  is a  $C_{1-6}$  alkyl group, methoxy, cyano, F, Cl, Br or I,  
 $Sp$  is an optionally substituted straight or branched  $C_{1-30}$  alkylene group, in which one or more  $-CH_2-$  groups may be replaced by a heteroatom and/or by a polar group and/or it is optionally possible that one or more carbon-carbon single bond(s) is/are replaced by a carbon-carbon double or a triple bond,  
 $k$  is an integer having a value of from 0 to 4,  
 $X$  is  $-O-$ ,  $-S-$ ,  $-NH-$ ,  $-N(CH_3)-$ ,  $-CH(OH)-$ ,  $-CO-$ ,  $-CH_2(CO)-$ ,  $-SO-$ ,  $-CH_2(SO)-$ ,  $-SO_2-$ ,  $-CH_2(SO_2)-$ ,  $-COO-$ ,  $-OCO-$ ,  $-OCO-O-$ ,  $-S-CO-$ ,  $-CO-S-$ ,  $-SOO-$ ,  $-OSO-$ ,  $-SOS-$ ,  $-CH_2-CH_2-$ ,  $-OCH_2-$ ,  $-CH_2O-$ ,  $-CH=CH-$ ,  $-C\equiv C-$ , or a single bond,  
 $t$  is an integer having a value of 0 or 1.

26. A compound according to any one of claims 24 or 25, wherein at least one of  $A^1$  to  $A^4$  of formula (I) is a group of formula (II):



wherein:

- $P$  is a polymerizable group such as  $CH_2=CW-$ ,  
 $CH_2=CW-O-$ ,  $CH_2=CW-COO-$  or



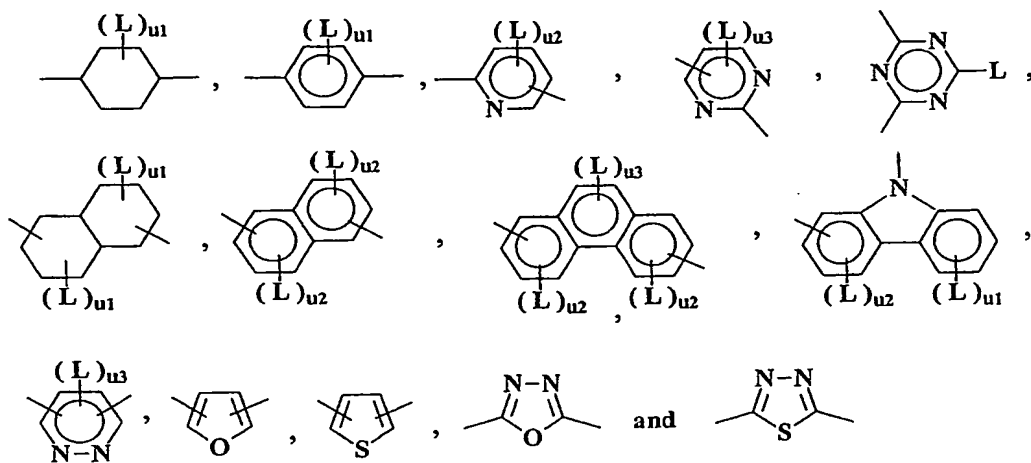
wherein:

- $W$  is H,  $CH_3$ , F, Cl, Br or I,  
 $R''$  is a  $C_{1-6}$  alkyl group, methoxy, cyano, F, Cl, Br or I.  
 $Sp$  is a  $C_{1-22}$  branched or straight-chain alkylene group, in which one or more  $-CH_2-$  groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from  $-O-$ ,  $-CH(OH)-$ ,  $-SO_2-$ ,  $-COO-$ ,  $-OCO-$ ,  $-OCO-O-$ ,  $-CH=CH-$ ,  $-C\equiv C-$ ,  $-(CF_2)_r-$ ,  
 with the proviso that no two oxygen atoms are directly linked to each other, and wherein  $r$  is an integer between 1 and 10,



k is 1,  
 X is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond,  
 more preferably -O-, -COO-, -OCO- or a single bond,  
 t is 1.

27. A compound according to any one of claims 24 to 26 wherein C<sup>1</sup> to C<sup>4</sup> are preferably selected from:



wherein:

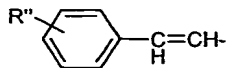
L being -CH<sub>3</sub>, -COCH<sub>3</sub>, -NO<sub>2</sub>, -CN or halogen,  
 u1 is 0, 1, 2, 3, or 4,  
 u2 is 0, 1, 2, or 3,  
 u3 is 0, 1, or 2.

28. A compound according to any one of claims 24 to 27, wherein:  
 C<sup>1</sup> to C<sup>4</sup> are selected from optionally substituted cyclohexyl or cyclohexylene, phenyl or phenylene, naphthyl or naphthylene or phenanthryl or phenanthrylene,  
 A<sup>1</sup> to A<sup>4</sup> independently from each other is hydrogen, a polar group such as cyano, nitro, a halogen, or a group of formula (II),



in which:

P is hydrogen or a polymerizable group such as  $\text{CH}_2=\text{CW}-$ ,  $\text{CH}_2=\text{CW}-\text{O}-$ ,  $\text{CH}_2=\text{CW}-\text{COO}-$  or



wherein:

W is H,  $\text{CH}_3$ , F, Cl, Br or I,

R'' is a  $\text{C}_{1-6}$  alkyl group, methoxy, cyano, F, Cl, Br or I,

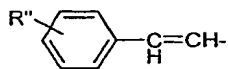
Sp is a  $\text{C}_{1-22}$  branched or straight-chain alkylene group, in which one or more  $-\text{CH}_2-$  groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from  $-\text{O}-$ ,  $-\text{CH}(\text{OH})-$ ,  $-\text{SO}_2-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{OCO}-\text{O}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ ,  $-(\text{CF}_2)_r-$ , with the proviso that no two oxygen atoms are directly linked to each other, and wherein r is an integer between 1 and 10,

k is 1,

X is  $-\text{O}-$ ,  $-\text{CO}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ , or a single bond, more preferably  $-\text{O}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$  or single bond,

t is 1,

with the proviso that at least one of A1 to A4 comprises a polymerizable group such as  $\text{CH}_2=\text{CW}-$ ,  $\text{CH}_2=\text{CW}-\text{O}-$ ,  $\text{CH}_2=\text{CW}-\text{COO}-$  or



wherein:

W is H,  $\text{CH}_3$ , F, Cl, Br or I,

R'' is a  $\text{C}_{1-6}$  alkyl group, methoxy, cyano, F, Cl, Br or I.

29. A compound according to any one of claims 24 to 28, wherein:

A<sup>1</sup> comprises a polymerizable group such as  $\text{CH}_2=\text{CW}-$ ,  $\text{CH}_2=\text{CW}-\text{O}-$ ,  $\text{CH}_2=\text{CW}-\text{COO}-$ ,

wherein:

W is H or CH<sub>3</sub>,

A<sup>2</sup>

has the meaning of formula (II),

P-(Sp)<sub>k</sub>-(X)<sub>t</sub> - (II)

in which:

P is hydrogen or a polymerizable group such as CH<sub>2</sub>=CW-, CH<sub>2</sub>=CW-O- or CH<sub>2</sub>=CW-COO-,  
wherein:

W is H or CH<sub>3</sub>,

Sp is a branched C<sub>3</sub>-C<sub>16</sub> alkylene group, optionally comprising at least one oxocarbonyl or carbonyloxy group, or is a straight C<sub>2</sub>-C<sub>16</sub> alkylene group, comprising at least one oxocarbonyl or carbonyloxy group, wherein one or more -CH<sub>2</sub>- groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from -O-, -CH=CH-, -C≡C-, with the proviso that no two oxygen atoms are directly linked to each other,

k is 1,

X is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond, more preferably -O-, -COO-, -OCO- or a single bond,

t is 1

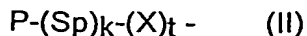
A<sup>4</sup>

is hydrogen.

30. A compound according to any one of claims 24 to 29, wherein:

A<sup>1</sup>

has the meaning of formula (II),



wherein:

P is hydrogen or a polymerizable group such as

CH<sub>2</sub>=CW-, CH<sub>2</sub>=W-O- or CH<sub>2</sub>=CW-COO-,

wherein:

W is H or CH<sub>3</sub>,

Sp is a branched C<sub>3</sub>-C<sub>16</sub> alkylene group, optionally comprising at least one oxocarbonyl or carbonyloxy group, or is a straight C<sub>2</sub>-C<sub>16</sub> alkylene group, comprising at least one oxocarbonyl or carbonyloxy group, wherein one or more -CH<sub>2</sub>- groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from -O-, -CH=CH-, -C≡C-, with the proviso that no two oxygen atoms are directly linked to each other,

k is 1,

X is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond, more preferably -O-, -COO-, -OCO- or a single bond,

t is 1,

A<sup>2</sup>

comprises a polymerizable group such as CH<sub>2</sub>=CW-,

CH<sub>2</sub>=CW-O-, or CH<sub>2</sub>=CW-COO-,

wherein:

W is H or CH<sub>3</sub>,

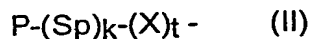
A<sup>4</sup>

is hydrogen.

31. A compound according to any one of claims 24 to 30, wherein:

A<sup>1</sup>

has the meaning of formula (II),



wherein:

P is hydrogen or a polymerizable group such as  $CH_2=CW-$ ,  $CH_2=CW-O-$  or  $CH_2=W-COO-$ ,  
wherein:

W is H or  $CH_3$ ,

Sp is a branched  $C_3-C_{16}$  alkylene group, optionally comprising at least one oxocarbonyl or carbonyloxy group, or is a straight  $C_2-C_{16}$  alkylene group, comprising at least one oxocarbonyl or carbonyloxy group, wherein one or more  $-CH_2-$  groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from  $-O-$ ,  $-CH=CH-$ ,  $-C\equiv C-$ , with the proviso that no two oxygen atoms are directly linked to each other,

k is 1,

X is  $-O-$ ,  $-CO-$ ,  $-COO-$ ,  $-OCO-$ ,  $-CH=CH-$ ,  $-C\equiv C-$ , or a single bond, more preferably  $-O-$ ,  $-COO-$ ,  $-OCO-$  or a single bond,

t is 1,

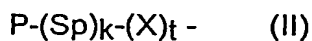
$A^3$  comprises a polymerizable group such as  $CH_2=CW-$ ,  $CH_2=CW-O-$ , or  $CH_2=CW-COO-$ ,  
wherein:

W is H or  $CH_3$ ,

$A^4$  is hydrogen.

32. A compound according to any one of claims 24 to 31, wherein:

$A^2$  has the meaning of formula (II),



wherein:

P is hydrogen or a polymerizable group such as  $CH_2=CW-$ ,  $CH_2=CW-O-$  or  $CH_2=CW-COO-$ ,

wherein:

W is H or  $CH_3$ ,

Sp is a branched  $C_3-C_{16}$  alkylene group, optionally comprising at least one oxocarbonyl or carbonyloxy group, or is a straight  $C_2-C_{16}$  alkylene group, comprising at least one oxocarbonyl or carbonyloxy group, wherein one or more  $-CH_2-$  groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from  $-O-$ ,  $-CH=CH-$ ,  $-C\equiv C-$ , with the proviso that no two oxygen atoms are directly linked to each other,

k is 1,

X is  $-O-$ ,  $-CO-$ ,  $-COO-$ ,  $-OCO-$ ,  $-CH=CH-$ ,  $-C\equiv C-$ , or a single bond, more preferably  $-O-$ ,  $-COO-$ ,  $-OCO-$  or a single bond,

t is 1,

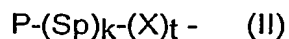
$A^3$  comprises a polymerizable group such as  $CH_2=CW-$ ,  $CH_2=CW-O-$ , or  $CH_2=CW-COO-$ ,  
wherein:

W is H or  $CH_3$ ,

$A^4$  is hydrogen.

33. A compound according to any one of claims 24 to 32, wherein:

$A^1$  and  $A^2$  have the meaning of formula (II),



wherein:

P is hydrogen or a polymerizable group such as  $\text{CH}_2=\text{CW}-$ ,  $\text{CH}_2=\text{CW}-\text{O}-$  or  $\text{CH}_2=\text{CW}-\text{COO}-$ ,  
wherein:

W is H or  $\text{CH}_3$ ,

Sp is a branched  $\text{C}_3\text{-C}_{16}$  alkylene group, optionally comprising at least one oxocarbonyl or carbonyloxy group, or is a straight  $\text{C}_2\text{-C}_{16}$  alkylene group, comprising at least one oxocarbonyl or carbonyloxy group, wherein one or more  $-\text{CH}_2-$  groups present in the hydrocarbon chain may be replaced, independently, by one or more groups selected from  $-\text{O}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ , with the proviso that no two oxygen atoms are directly linked to each other,

k is 1,

X is  $-\text{O}-$ ,  $-\text{CO}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ , or a single bond, more preferably  $-\text{O}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$  or a single bond,

t is 1,

$\text{A}^3$  comprises a polymerizable group such as  $\text{CH}_2=\text{CW}-$ ,  $\text{CH}_2=\text{CW}-\text{O}-$ , or  $\text{CH}_2=\text{CW}-\text{COO}-$ ,  
wherein:

W is H or  $\text{CH}_3$ ,

$\text{A}^4$  is hydrogen.

34. A compound according to any one of claims 24 to 33, wherein at least one of  $\text{A}^1$  to  $\text{A}^3$  has the meaning of formula (II),

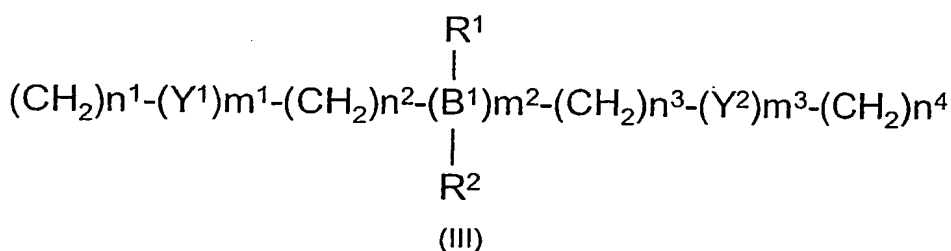


wherein:

P is hydrogen or a polymerizable group such as  $\text{CH}_2=\text{CW}-$ ,  $\text{CH}_2=\text{CW}-\text{O}-$ ,  $\text{CH}_2=\text{CW}-\text{COO}-$ ,  
wherein:

W is H or  $\text{CH}_3$ ,

Sp has the meaning of formula (III)



wherein:

$\text{Y}^1$  and  $\text{Y}^2$  each independently represent  $-\text{OCO}-$  or  $-\text{COO}-$ ,

$\text{B}^1$  represents C or CH,

$\text{R}^1$  and  $\text{R}^2$  each independently represent hydrogen or a  $\text{C}_1$ - $\text{C}_{12}$  alkyl residue, preferably a  $\text{C}_1$ - $\text{C}_6$  alkyl residue, such as methyl, ethyl, propyl, butyl, pentyl, hexyl or isopropyl residue,

$n_1$ ,  $n_2$ ,  $n_3$  and  $n_4$  are independently integers from 0 to 15, such that  $0 \leq n_1 + n_2 + n_3 + n_4 \leq 15$ ,

$m_1$ ,  $m_2$  and  $m_3$  are independently integers from 0 to 3, such that  $1 \leq m_1 + m_2 + m_3 \leq 3$  and

wherein

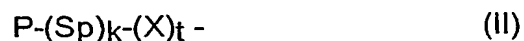
one or more  $-\text{CH}_2-$  groups present in the hydrocarbon chain of (III) may be replaced, independently, by one or more groups selected from  $-\text{O}-$ ,  $-\text{CH}=\text{CH}-$  or  $-\text{C}\equiv\text{C}-$ ,

with the proviso that the carbon-carbon double bond of P is not directly connected to the carbon atom of  $\text{Y}^1$  or  $\text{Y}^2$ ,



k is 1,  
 X is -O-, -CO-, -COO-, -OCO-, -CH=CH-, -C≡C-, or a single bond, more preferably -O-, -COO-, -OCO- or a single bond,  
 t is 1.

35. A compound according to any one of claims 24 to 34, wherein at least one of A<sup>1</sup> to A<sup>3</sup> has the meaning of formula (II),

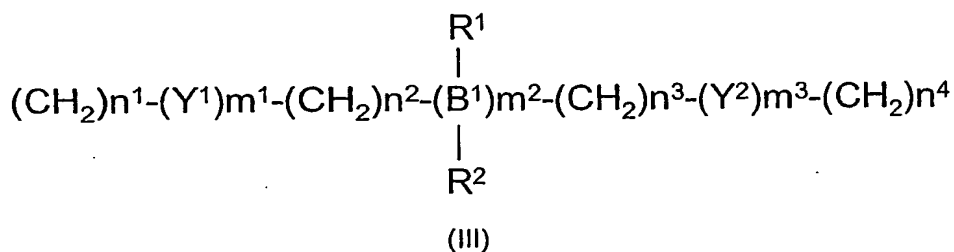


Wherein:

P is hydrogen or a polymerizable group such as CH<sub>2</sub>=CW-,  
 CH<sub>2</sub>=CW-O-, CH<sub>2</sub>=CW-COO-,  
 wherein:

W is H or CH<sub>3</sub>,

Sp has the meaning of formula (III)



wherein:

Y<sup>1</sup> and Y<sup>2</sup> each independently represent -OCO- or -COO-,

B<sup>1</sup> represents C or CH,

R<sup>1</sup> is hydrogen,

R<sup>2</sup> represents a methyl, ethyl, propyl, butyl, pentyl or hexyl group and most preferably a methyl or ethyl group,

$n_1, n_2, n_3$  and  $n_4$  are independently integers from 0 to 15, such that  $0 \leq n_1 + n_2 + n_3 + n_4 \leq 15$ ,  
 $m_1, m_2$  and  $m_3$  are independently integers from 0 to 3, such that  $1 \leq m_1 + m_2 + m_3 \leq 3$ , and wherein

one or more  $-\text{CH}_2-$  groups present in the hydrocarbon chain of (III) may be replaced, independently, by one or more groups selected from  $-\text{O}-$ ,  $-\text{CH}=\text{CH}-$  or  $-\text{C}\equiv\text{C}-$ , with the proviso that the carbon-carbon double bond of P is not directly connected to the carbon atom of  $\text{Y}^1$  or  $\text{Y}^2$ ,

$k$  is 1,

$X$  is  $-\text{O}-$ ,  $-\text{CO}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ , or a single bond, more preferably  $-\text{O}-$ ,  $-\text{COO}-$ ,  $-\text{OCO}-$  or a single bond,

$t$  is 1.

36. Use of a chiral or achiral rod shaped compound according to any one of claims 21 to 35 for the preparation of mesogenic polymer mixtures according to any one of claims 1 to 20.
37. Polymer networks prepared from a mixture according to any one of claims 1 to 20.
38. Liquid crystalline polymer films prepared from a mixture according to any one of claims 1 to 20.
39. Use of a polymer network according to claim 37 or a liquid crystalline polymer film according to claim 38 for the preparation of unstructured or structured optical and electro-optical components and multilayer systems.
40. Use of a mixture according to any one of claims 1 to 20 for the preparation of an elastomer, polymer gel, polymer network or polymer film.
41. Use of a polymer network according to claim 37 or of a liquid crystalline polymer film according to claim 38 for the manufacture of devices such as waveguides,

optical gratings, filters, retarders, polarizers, piezoelectric cells or thin film exhibiting non-linear optical properties.

42. Optical or electro-optical components comprising a polymer network according to claim 37 or a liquid crystalline polymer film according to claim 38.